Abstract Submittal Form

JANNAF
Liquid Propulsion Subcommittee and Advanced Materials Panel
Technical Interchange Meeting
3 – 5 September 2014

Abstract Due Date: Wednesday, June 4, 2013

Title: Additive Manufacturing Design Considerations for Liquid Engine Components

Session Area: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ■ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9

Sponsoring organization if SBIR-funded:

Primary Author (this author will receive all correspondence regarding participation in this program)

Name: Dave Whitten
Organization: ER34
Address: ER34

City: MSFC	State: AL	ZIP Code: 35812
Phone: 256-544-7027	Fax:	Email:

2nd Author

Name: Andy Hissam
Organization: ER34
Address: ER34

City: MSFC	State: AL	ZIP Code: 35812
Phone: 256-544-8388	Fax:	Email:

3rd Author

Name: Kevin Baker
Organization: ER34
Address: ER34

City: MSFC	State: AL	ZIP Code: 35812
Phone: 256-544-5875	Fax:	Email:

4th Author

Name: Darron Rice
Organization: ER34
Address: ER34

City: MSFC	State: AL	ZIP Code: 35812
Phone: 256-544-8386	Fax:	Email:

Approval

☐ Approved by Management ☐ Placeholder

Abstract Submittal Form

JANNAF
Liquid Propulsion Subcommittee and Advanced Materials Panel
Technical Interchange Meeting
3 – 5 September 2014

Abstract Due Date: Wednesday, June 4, 2013

Unclassified Abstract (250 – 300 words; do not include figures or tables)

The Marshall Space Flight Center's Propulsion Systems Department has gained significant experience in the last year designing, building, and testing liquid engine components using additive manufacturing. The department has developed valve, duct, turbo-machinery, and combustion device components using this technology. Many valuable lessons were learned during this process. These lessons will be the focus of this presentation. We will present criteria for selecting part candidates for additive manufacturing. Some part characteristics are 'tailor made' for this process. Selecting the right parts for the process is the first step to maximizing productivity gains. We will also present specific lessons we learned about feature geometry that can and cannot be produced using additive manufacturing machines. Most liquid engine components were made using a two-step process. The base part was made using additive manufacturing and then traditional machining processes were used to produce the final part. The presentation will describe design accommodations needed to make the base part and lessons we learned about which features could be built directly and which require the final machine process. Tolerance capabilities, surface finish, and material thickness allowances will also be covered. Additive Manufacturing can produce internal passages that cannot be made using traditional approaches. It can also eliminate a significant amount of manpower by reducing part count and leveraging model-based design and analysis techniques. Information will be shared about performance enhancements and design efficiencies we experienced for certain categories of engine parts.

- By submitting an abstract, you agree to complete a final paper/presentation for publication and to attend the meeting to present this information.
- Submit abstracts electronically; submittal instructions are found in the call for papers.
- Direct questions to Kathleen Biglari, by phone at 410.992.7300 x 208, or email to kbiglari@cpiac.jhu.edu.